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umes on morphology and physiology, 50 volumes on geographic distribution, 2105 volumes of floras and taxonomic monographs on the phanerogams, 900 volumes on cryptogams, 640 volumes on agriculture, 325 volumes on gardening, 200 volumes on forestry and 200 volumes on meteorology. The total number of volumes on the shelves was 7117. Since this count was made the additions raise the total to about 8000. Some care has been taken to exclude books and proceedings which have only an incidental interest to botany, with the idea that such additions decrease the actual working efficiency of the library and increase the labor necessary for its administration. The books are classified according to the Dewey system of indexing, and pamphlets and separates are not indexed or included in the count until bound up in volumes by subject.

The collective efficiency of the facilities described above is such that the institution bids fair to meet the expectations of all its different classes of constituents. The large number of specialists of the staff, together with those of other institutions who offer to guide research here, gives the student, who may come here to carry on investigations, the widest range of election of work. Among those offering to guide research in the Garden are: Professor L. M. Underwood, Dr. C. C. Curtis, Dr. M. A. Howe, Dr. N. L. Britton, Dr. D. T. MacDougal, Dr. P. A. Rydberg, Dr. G. V. Nash, Dr. J. K. Small, Professor F. E. Lloyd, Mrs. E. G. Britton, and Professor E. S. Burgess.

The personal interest and care shown by the members of the Board of Managers in the organization of the Garden has resulted in placing it on its present broad foundation, while the energetic administration of the business details by the Director-in-chief has brought the institution through the most critical part of its constructive period without departure from the original plans,

without financial deficit, and with no undue loss of time.

The original guarantee fund has been preserved intact and increased by gifts and bequests to nearly \$300,000, the income of which is available; a second source of income consists of the fees of the members, and a third source is the support received from the Department of Public Parks of the City of New York.

D. T. MACDOUGAL.

SCIENTIFIC BOOKS.

The Unknown. By CAMILLE FLAMMARION. Harper & Brothers. 1900. Pp. 488.

This volume consists of a plea for the existence of unknown or unrecognized psychical forces or manifestations, and an attempt to popularize this branch of investigation, by an astronomer who is known for similar contributions to other fields—some of them of a pronounced imaginative type. When one applies to the work the critical examination which science demands, the estimate of its value must be distinctly unfavorable. Its defects are many and serious; its merits do not go beyond those included in a laborious compilation of refractory material and a thorough and sincere interest. Its contents include two introductory chapters on the dangers of excessive incredulity as well as of a too ready credulity; a large collection of cases of communications made by the dying and regarded as evidence of telepathy; a similar collection of related cases of thought transmission and clairvoyance under other conditions; a consideration of dreams and of premonitions and of hallucinations, mainly again as indicative of abnormal psychic operations; and some scattered and weak attempts to interpret these phenomena on a telepathic and 'psychic force' hypothesis. The dominant tone of the book is one not uncommon in French writings of similar purpose, and one particularly unattractive to the Anglo-Saxon intellect; there is much protesting of the necessity of careful observation and of not accepting anything except on a sufficient evidence, and again of the limitations of human knowledge and of the readiness with which even

learned men make mistakes and form prejudices, and of the ultimate possibility of almost any theory and belief; there is much use of analogies without any discernment of the essential likeness or unlikeness upon which the value of all analogies rests; there is an attempt to write the matter up for and down to the public which when put into matter-of-fact and not too skillful English produces an unfortunate impression of self-assurance and an assumption on the part of the writer of an intense interest in his opinions on the part of the public.

Viewed as a contribution to a domain of knowledge most familiarly known as 'Psychical Research,' the work's fundamental faults are a lack of critical judgment in the estimation of evidence, and of an appreciation of the nature of the logical conditions which the study of these problems presents. In this respect it forms a marked contrast with the best of the English contributions to the same topics, notwithstanding an essential agreement of results. Although the motto of one of the chapters is 'Des faits ! Pas de phrases,' the readiness of the author to accept as real fact the elaborated and often biased report of an unskilled witness, and to pay himself with words in his own use of the evidence, are lamentably conspicuous. A writer who can say of the reports of 4280 miscellaneous correspondents who reply to his request for cases of unusual 'psychic experiences'; "What struck me in all these narratives was the loyalty, good faith, frankness, and delicacy of the writers, who were careful to tell only what they knew and how they came to know it, without adding to or subtracting anything from the subject. Every one of them was the servant of truth," gives more evidence of his confidence in human nature than of his fitness to undertake such an investigation. A writer who can cite the persistence of sensations referred to amputated limbs, and the familiar principle of 'eccentric projection' that the sources of our sensations are referred outward to an external object, and the subjective character of color sensations, as psychological data suggestive of or corroborative of telepathy; who can transfer the physical principle of sympathetic vibration to imaginary brain vibrations and state that

"All facts relating to the production and association of ideas can be explained by the occurrence of vibrations of the brain and of the nervous system which originates in the brain; this was demonstrated by David Hartley in the last century," gives further evidence of his incapacity for the task which he has elected to perform.

From beginning to the end of the volume there is no evidence that the author has considered or is familiar with the explanations of a non-telepathic nature which have been offered for some of the facts with which he deals. The fact that hypnotized subjects are quick to seize and act upon the unconscious wishes or suggestions of their hypnotizers is put down as evidence of telepathy without mention of other far more simple and more adequately demonstrated explanations; and the considerable evidence for regarding many 'veridical' presentiments and premonitions as illusions of memory is likewise ignored. Instead of a carefully developed logical argument, strengthened at every step by an examination of rival hypotheses and of the sources of error inherent in the evidence; instead of the critical analysis and differentiation of cases and a discernment of the prominent factors of community and divergence of the observations; we have only reiteration with increasing emphasis of the truth of the author's favorite hypothesis, and an endless compilation of stories that may be interesting and even significant but hardly justify the purpose to which they are applied. "Brains are centres of radiation." "But the actual FACT of the action of the soul at a distance is now demonstrated." "*The action of one human being upon another, from a distance, is a scientific fact; it is as certain as the existence of Paris, of Napoleon, of Oxygen, or of Sirius.*" "There are mental transmissions, communications of thoughts, and psychic currents between human souls." "PSYCHIC FORCE EXISTS. ITS NATURE IS YET UNKNOWN." "We may see without eyes and hear without ears, . . . by some interior sense, psychic and mental." "The soul by its interior vision, may see *not only what is passing at a great distance, but it may also know in advance what is to happen in the future.* The future exists potentially, determined by causes which bring

to pass successive events." If such statements as these are warranted by the evidence which is offered, then the logic of this science is not that of the other sciences.

The popular interest in the topic which this volume treats, the obvious intention to gain the ear of the public by recounting tales of merely personal interest and passing them off as scientific data, the confident expression of the author in the certainty of his conclusions, will all combine to circulate the notion among the public at large that the conclusions of the volume represent the final verdict of science on these momentous questions; and it is in this respect that the volume is likely to exert a seriously unfortunate influence. It is difficult enough at best to get the intelligent layman to understand that the ability to interpret soundly and rationally phenomena of this field demands, like all expert opinion, a special knowledge and a fitness of training and intellect. It is quite idle to expect the layman to distinguish too closely between one scientist and another, or between the methods which they use and the dicta which they express. Possibly (and it were better if one could say probably) M. Flammarion has so seriously overstepped the limits of sound judgment and expression in this matter, that his authority will be called into question by the reader who reflects as he reads. There is no good reason why an astronomer with a gift for popularization and an interest in the phenomena of the 'Unknown' should not prepare as good and valuable an account of these phenomena as the present state of knowledge permits. There is no desire on the part of psychologists to discountenance such investigation, whatever its origin. But it is essential that the investigator should thoroughly know what the present state of knowledge really is, and above all, that he should possess the indispensable logical appreciation of the conditions of the various problems.

This logical vigor and discernment, this essential logical insight that is both a natural endowment and the result of conscientious training is not the prerogative of any one science nor of scientists at large; and he who has it has the most important part of the equipment necessary to the participation in such investigations. It is because this volume is conspicuously lacking

in these qualities, and because it as a consequence substitutes for them uncritical collections of narratives and dogmatically stated conclusions, that it must be disavowed by those who stand for the thoroughly scientific investigation of the unexplored regions of the psychological universe. It is very certain that if M. Flammarion and his colleagues had used the same methods in astronomy as he applies to the investigations of this volume, modern astronomy would be held in very different repute from that which it now enjoys. There is an amateur and an expert exploration of this field, just as there is in geographical exploration, and it will require the best trained and most scientific explorer to reveal the true nature of this 'darkest Africa' of the human mind.

JOSEPH JASTROW.

Histoire des mathématiques. Par JACQUES BOYER. GEORGES CARRÉ et C. NAUD, Éditeurs. Paris. 1900. Pp. 260.

The growing interest in the history of science is made manifest by the number of historical works which have appeared in recent years. Perhaps in no science is this movement so marked as in mathematics. During the last twenty years there have appeared not only the monumental works of Moritz Cantor and Maxilien Marie, but also a large number of brief histories. The volume before us belongs to the latter class.

An attractive feature of this book are the page-portraits of nineteen mathematicians and seven facsimiles of parts of celebrated manuscripts and of old drawings of mathematical instruments. We know of no other general history of mathematics which furnishes the reader such a treat. So high is our appreciation of this feature that we are ready to forgive the author when we discover that, out of a total number of nineteen mathematicians whom he has honored with portraits, eleven are Frenchmen.

M. Boyer's history is written in an interesting style and will doubtless stimulate more serious study of mathematical history in larger works. But in two respects the author has hardly achieved what might have been expected of him.